

**Remarks/Arguments:**

This is a reply to the office action of January 30.

Claim 16 has been amended to overcome the rejection under section 112 of the statute. Basis for the amended language is found at paragraph [0006] of the description.

Claims 9 - 16 were rejected as obvious over Clevenger (U.S. Patent 4528228) in view of Holland (U.S. Patent 5334623). Claim 9 has been amended to better distinguish the invention from the prior art.

Clevenger discloses a cavity containing a cushioning material. Ethylene gas is withdrawn from ambient atmosphere by chemical reaction with a substance added to the cushioning material. An specific substance mentioned is potassium permanganate.

Holland discloses tetrazines for binding ethylene gas via a chemical reaction. Because tetrazines are unstable in the presence of water (see Holland, col. 1, lines 63 - 66), the disclosed ethylene-permeable substrate is hydrophobic (Holland, col. 2, lines 1 - 2). The reference does not disclose a cavity in which the substance is placed; rather, the substance is incorporated into a matrix.

Both documents disclose binding ethylene gas by means of a chemical reaction. In contrast, the present application describes a material which retains the ethylene gas mainly due to its physical structure, i.e., the ethylene gas is absorbed and/or adsorbed by a physical process. See paragraph [0010], lines 2 and 4. This is a material difference from the chemical processes described in the prior art.

As disclosed in the application at paragraph [0008], the moisture content of the gas-retaining substance should not exceed 2% of its dry weight. Claim 9 has been

amended to recite this limitation. Humidity has a detrimental effect on the efficiency of the retaining capability of the substance, so the atmosphere within the cavity must be kept dry. This is achieved by manufacturing the two plies from a material – such as hydrophobic cellulose – which is permeable to gaseous ethylene but impermeable to water vapor.

The chemical potassium permanganate used to bind ethylene gas in U.S. Patent 4528228 is not food grade. It is “harmful if swallowed” (see page 4 of the attached Material Safety Data Sheet marked “Appendix A”, which also lists some of the serious harmful effects of this substance). Additionally, the tetrazines used to bind ethylene gas as disclosed in U.S. Patent 5334623 are generally not food grade, as shown by the attached Material Safety Data Sheet marked “Appendix B”, which cautions against ingestion in Section 4. If their outer plies of these devices were damaged, their chemicals could unknowingly contaminate the fruits or other plant material. They therefore pose a greater health risk than with the substance disclosed in the present application.

We believe that the claims now presented distinguish the invention from the prior art, and that this application is now in condition for allowance.

Respectfully submitted,

/Charles Fallow/

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May 30, 2008

**APPENDIX "A"**

## MATERIAL SAFETY DATA SHEET

Date Printed: 05/29/2008

Date Updated: 02/01/2006

Version 1.7

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Section 1 - Product and Company Information

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Product Name	POTASSIUM PERMANGANATE, BIOULTRA, >= 99.0 % RT
Product Number	60459
Brand	FLUKA
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

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Section 2 - Composition/Information on Ingredient

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Substance Name	CAS #	SARA 313
POTASSIUM PERMANGANATE	7722-64-7	Yes
Formula	KMnO4	
Synonyms	Cairox * Chameleon mineral * C.I. 77755 * Condyl's crystals * Permanganate de potassium (French) * Permanganate of potash * Potassio (permanganato di) (Italian) * Potassium permanganate * Potassium (permanganate de) (French)	
RTECS Number:	SD6475000	

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Section 3 - Hazards Identification

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## EMERGENCY OVERVIEW

Oxidizing. Harmful. Dangerous for the environment.  
Contact with combustible material may cause fire. Harmful if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## HMIS RATING

HEALTH: 1  
FLAMMABILITY: 0  
REACTIVITY: 3  
SPECIAL HAZARD(S): Oxidizer

## NFPA RATING

HEALTH: 1  
FLAMMABILITY: 0  
REACTIVITY: 3  
SPECIAL HAZARD(S): Oxidizer

For additional information on toxicity, please refer to Section 11.

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Section 4 - First Aid Measures

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## ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is

conscious. Call a physician.

#### INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

#### DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

#### EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

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### Section 5 - Fire Fighting Measures

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#### FLASH POINT

N/A

#### AUTOIGNITION TEMP

N/A

#### FLAMMABILITY

N/A

#### EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

#### FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions. Contact with other material may cause fire. May accelerate combustion.

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### Section 6 - Accidental Release Measures

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#### PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area.

#### PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

#### METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

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### Section 7 - Handling and Storage

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#### HANDLING

User Exposure: Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

#### STORAGE

Suitable: Keep tightly closed. Keep away from combustible materials, heat, sparks, and open flame.

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## Section 8 - Exposure Controls / PPE

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### ENGINEERING CONTROLS

Use only in a chemical fume hood. Safety shower and eye bath.

### PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand: Compatible chemical-resistant gloves.

Eye: Chemical safety goggles.

### GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Remove and wash contaminated clothing promptly. Discard contaminated shoes.

### EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	0.2 MG(MN)/M3
USA	MSHA Standard-air	Ceiling	co5 MG(MN)/M3
USA	OSHA.	PEL	CL 5 MG(MN)/M3

New Zealand OEL

Remarks: check ACGIH TLV

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## Section 9 - Physical/Chemical Properties

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Appearance                      Physical State: Solid  
                                    Color: Deep violet  
                                    Form: Fine crystals

Property	Value	At Temperature or Pressure
Molecular Weight	158.04 AMU	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	240 °C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	2.71 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	

Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

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## Section 10 - Stability and Reactivity

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### STABILITY

Stable: Stable.

Materials to Avoid: Strong reducing agents, Finely powdered metals, Peroxides, Zinc, Copper.

### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Nature of decomposition products not known.

### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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## Section 11 - Toxicological Information

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### ROUTE OF EXPOSURE

Skin Contact: May cause skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: May cause eye irritation.

Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: Harmful if swallowed.

### SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system. Early symptoms include languor, sleepiness and weakness in the legs. A stolid mask-like appearance of the face, emotional disturbances such as uncontrollable laughter and a spastic gait with tendency to fall in walking are findings in more advanced cases. High incidence of pneumonia has been found in workers exposed to the dust or fume of some manganese compounds.

### TOXICITY DATA

Oral

Woman

100 mg/kg

LDLO

Remarks: Liver:Hepatitis (hepatocellular necrosis), diffuse. Vascular:BP lowering not characterized in autonomic section. Kidney, Ureter, Bladder:Changes in tubules (including acute renal failure, acute tubular necrosis).

Oral

Human

143 mg/kg

LDLO

Remarks: Lungs, Thorax, or Respiration:Dyspnea.

Gastrointestinal:Other changes.

Oral

Rat  
1090 mg/kg  
LD50

Oral  
Mouse  
2157 mg/kg  
LD50

Remarks: Behavioral:Somnolence (general depressed activity).

Oral  
Guinea pig  
1151 mg/kg  
LD50

Remarks: Behavioral:Somnolence (general depressed activity).

#### CHRONIC EXPOSURE - MUTAGEN

Species: Mouse  
Route: Oral  
Dose: 205 MG/KG  
Exposure Time: 24H  
Mutation test: Micronucleus test

Species: Mouse  
Route: Oral  
Dose: 718 MG/KG  
Exposure Time: 7D  
Mutation test: Cytogenetic analysis

Species: Mouse  
Dose: 1 MMOL/L  
Exposure Time: 48H  
Cell Type: mammary gland  
Mutation test: Cytogenetic analysis

Species: Mouse  
Route: Oral  
Dose: 513 MG/KG  
Exposure Time: 5D  
Mutation test: sperm

#### CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat  
Dose: 400 MG/KG  
Route of Application: Intratesticular  
Exposure Time: (1D MALE)  
Result: Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Species: Mouse  
Dose: 513 MG/KG  
Route of Application: Oral  
Exposure Time: (5D MALE)  
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Gerbil  
Dose: 25 MG/KG  
Route of Application: Intratesticular

Exposure Time: (1D MALE)  
Result: Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

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## Section 12 - Ecological Information

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No data available.

### ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish  
Species: Onchorhynchus mykiss (Rainbow trout)  
Time: 96 h  
Value: 0.3 - 0.6 mg/l

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## Section 13 - Disposal Considerations

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### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

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## Section 14 - Transport Information

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### DOT

Proper Shipping Name: Potassium permanganate  
UN#: 1490  
Class: 5.1  
Packing Group: Packing Group II  
Hazard Label: Oxidizer  
PIH: Not PIH

### IATA

Proper Shipping Name: Potassium permanganate  
IATA UN Number: 1490  
Hazard Class: 5.1  
Packing Group: II

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## Section 15 - Regulatory Information

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### EU DIRECTIVES CLASSIFICATION

Symbol of Danger: O-Xn-N  
Indication of Danger: Oxidizing. Harmful. Dangerous for the environment.  
R: 8-22-50/53  
Risk Statements: Contact with combustible material may cause fire. Harmful if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
S: 60-61  
Safety Statements: This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

### US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Oxidizing. Harmful. Dangerous for the environment.  
Risk Statements: Contact with combustible material may cause fire. Harmful if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
Safety Statements: This material and its container must be disposed of as hazardous waste.



UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 1 %

NOTES: This product is subject to SARA section 313 reporting requirements - manganese compounds.

TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

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Section 16 - Other Information

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DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

**APPENDIX "B"**

## MATERIAL SAFETY DATA SHEET

Date Printed: 05/27/2008

Date Updated: 01/31/2006

Version 1.3

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Section 1 - Product and Company Information

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Product Name	3,6-DIPHENYL-1,2,4,5-TETRAZINE - 250 MG
Product Number	S601489
Brand	ALDRICH
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

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Section 2 - Composition/Information on Ingredient

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Substance Name	CAS #	SARA 313
3,6-DIPHENYL-1,2,4,5-TETRAZINE	6830-78-0	No
Formula	C14H10N4	
Synonyms	Diphenyl-s-tetrazine * 3,6-Diphenyltetrazine * 3,6-Diphenyl-1,2,4,5-tetrazine * s-Tetrazine, 2,6-diphenyl-	
RTECS Number:	XF6863300	

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Section 3 - Hazards Identification

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## EMERGENCY OVERVIEW

Irritant.

Irritating to eyes, respiratory system and skin.

For additional information on toxicity, please refer to Section 11.

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Section 4 - First Aid Measures

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## ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

## INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

## DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

## EYE EXPOSURE

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

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Section 5 - Fire Fighting Measures

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FLASH POINT  
N/A

AUTOIGNITION TEMP  
N/A

FLAMMABILITY  
N/A

EXTINGUISHING MEDIA  
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING  
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.  
Specific Hazard(s): Emits toxic fumes under fire conditions.

EXPOSURE HAZARD(S)  
Material: Irritant.

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## Section 6 - Accidental Release Measures

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PROCEDURE(S) OF PERSONAL PRECAUTION(S)  
Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP  
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

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## Section 7 - Handling and Storage

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HANDLING  
User Exposure: Do not breathe dust. Avoid contact with eyes, skin, and clothing.

STORAGE  
Suitable: Keep tightly closed. Store in a cool dry place.

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## Section 8 - Exposure Controls / PPE

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ENGINEERING CONTROLS  
Safety shower and eye bath. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT  
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a dust mask type N95 (US) or type P1 (EN 143) respirator.  
Hand: Compatible chemical-resistant gloves.  
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES  
Wash thoroughly after handling. Wash contaminated clothing before reuse.

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## Section 9 - Physical/Chemical Properties

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Molecular Weight                      234.26 AMU

pH	N/A
BP/BP Range	N/A
MP/MP Range	198 °C
Freezing Point	N/A
Vapor Pressure	N/A
Vapor Density	N/A
Saturated Vapor Conc.	N/A
SG/Density	N/A
Bulk Density	N/A
Odor Threshold	N/A
Volatile%	N/A
VOC Content	N/A
Water Content	N/A
Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	N/A
Surface Tension	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

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## Section 10 - Stability and Reactivity

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### STABILITY

Materials to Avoid: Strong oxidizing agents.

### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Nitrogen oxides.

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## Section 11 - Toxicological Information

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### ROUTE OF EXPOSURE

Inhalation: Material is irritating to mucous membranes and upper respiratory tract.

Multiple Routes: Causes eye and skin irritation. May be harmful by inhalation, ingestion, or skin absorption.

### SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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## Section 12 - Ecological Information

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No data available.

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## Section 13 - Disposal Considerations

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### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

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## Section 14 - Transport Information

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### DOT

Proper Shipping Name: None  
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

### IATA

Non-Hazardous for Air Transport: Non-hazardous for air transport.

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## Section 15 - Regulatory Information

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### EU ADDITIONAL CLASSIFICATION

Symbol of Danger: Xi  
Indication of Danger: Irritant.  
R: 36/37/38  
Risk Statements: Irritating to eyes, respiratory system and skin.  
S: 26-36  
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

### US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Irritant.  
Risk Statements: Irritating to eyes, respiratory system and skin.  
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

### UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

### CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.  
DSL: No  
NDSL: No

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## Section 16 - Other Information

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### DISCLAIMER

For R&D use only. Not for drug, household or other uses.

### WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.